

Claims 1, 3-10 and 12-13 are rejected under 35 U.S.C. § 112, second paragraph. To obviate this rejection, the claim recitation "hydrocarbon compound" is replaced with --compound--. Applicants submit that the claims meet the requirements of 35 U.S.C. § 112, second paragraph. Therefore, the rejection under 35 U.S.C. § 112, second paragraph, should be withdrawn. Applicants respectfully request reconsideration and withdrawal of the rejection.

Claims 1, 3-4, 9-10 and 12-13 were rejected under 35 U.S.C. §103(a) over U.S. Patent No. 3,915,869 ("Katono") in view of U.S. Patent No. 4,211,662 ("King") and in further view of U.S. Patent No. 6,010,984 ("Heimann"). Applicants respectfully traverse this rejection because there is no motivation to combine Katono with King and Heimann.

To establish a *prima facie* case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine reference teachings. MPEP § 2143.

Katono discloses a lubricant for coating steel to prepare the steel for forming operations. Katono at column 1, lines 12-15. Katono discloses that lubricant for these purposes must form a film on the metal and must meet a number of requirements, including that it must be adapted to be readily removed from the metal after forming. Katono at column 1, lines 20-21, 23-24.

The Office Action admits that Katono does not teach utilizing molybdenum disulfide, tungsten disulfide, polytetrafluoroethylene or carbon graphite lubricating particles as instantly claimed. Office Action at page 3, section 5, lines 13-15. The Office Action relies on King and Heimann for disclosing lubricating particles of molybdenum disulfide, tungsten disulfide, polytetrafluoroethylene and carbon graphite. King discloses lubricating compositions including as an extreme pressure additive a mixture of one or more polymers of 1,2,4- and

1,3,4-thiadiazoledithiols and molybdenum disulfide. King at abstract. Heimann discloses corrosion resistant lubricants that can contain as friction and wear reducing agents molybdenum disulfide and polytetrafluoroethylene; and as extreme pressure agents graphite, molybdenum disulfide and tungsten disulfide. Heimann at title; column 3, line 60 to column 4, line 3.

However, there is no suggestion that the addition of the molybdenum disulfide, tungsten disulfide, polytetrafluoroethylene or carbon graphite disclosed in King and Heimann to Katono would result in a metal forming lubricant that would meet Katono's requirement that a lubricant be adapted to be readily removed from metal after forming. Thus there is no motivation to combine King and Heimann with Katono.

Because there is no motivation to combine King and Heimann with Katono, the cited prior art fails to have rendered obvious the claimed invention. Therefore, the rejection under 35 U.S.C. § 103(a) over Katono in view of King and in further view of Heimann should be withdrawn. Applicants respectfully request reconsideration and withdrawal of the rejection.

Claims 1, 5-10 and 12-13 are rejected under 35 U.S.C. §103(a) over JP 09-122974A ("JP-974") in view of U.S. Patent No. 6,068,918 ("Van Der Veer"). Applicants respectfully traverse this rejection because the cited prior art fails to teach or suggest the independent Claim 1 limitation of "at least one compound selected from the group consisting of carboxylic acids and metal carboxylates; ... the at least one compound has a saturated or unsaturated, linear or branched, structured width from 5 to 12 carbons atoms".

To establish a *prima facie* case of obviousness, the prior art references when combined must teach or suggest all of the claim limitations. MPEP §2143.

JP-974 discloses a small diameter welding wire surface coated with MoS<sub>2</sub>, and/or WS<sub>2</sub>, one or more metal soap, and lanolin. JP-974 of the English-language abstract.

However, the Office Action admits that JP-974 does not specifically teach that JP-974's metal soap is a metal soap of an acid. Office Action at page 4, section 6, lines 4-5. The Office Action cites Van Der Veer for teaching that metal salts of aromatic acids and naphthenic acid are preferred metal soaps. Office Action at page 4, section 6, lines 7-9.

Van DerVeer discloses a corrosion inhibiting composition containing a carrier of an oily or waxy type together with active components including at least one corrosion-inhibitor of the azole-type and a co-corrosion-inhibitor, together with optional water repellants or certain alcohols alone or in admixture. Van Der Veer at abstract, lines 1-5.

However, Van Der Veer fails to suggest the independent Claim 1 limitation that "the at least one compound has a saturated or unsaturated, linear or branched, structured width from 5 to 12 carbon atoms". Thus, Van Der Veer fails to remedy the deficiencies of JP-974.

Thus, JP-974 in view of Van Der Veer fails to suggest all of the limitations of independent Claim 1. Therefore, the rejection under 35 U.S.C. §103(a) over JP-974 in view of Van Der Veer should be withdrawn. Applicants respectfully request reconsideration and withdrawal of the rejection.

Claims 1, 3-4, 9-10 and 12-13 are rejected under 35 U.S.C. §103(a) over JP-974 in view of Katono. Applicants respectfully traverse this rejection because any *prima facie* case of obviousness based on the cited prior art is rebutted by the significant improvements in welding wire feedability achieved according to the claimed invention.

Objective evidence such as unexpected results are relevant to the issue of obviousness and must be considered in every case in which they are present. MPEP §2141.

The present invention provides a wire for welding which has, on the surface thereof, a lubricating oil chemically combined therewith, so that when the wire is used for welding over a long time, the lubricating substance is not separated from the wire and any inconvenience,

such as clogging of a spring liner in the inside thereof, is not caused by use of the wire. Specification at page 5, lines 15-22. The present invention provides a wire for welding which has improved wire feedabilities, ensuring stable, smooth feed thereof. Specification at page 6, lines 1-3.

If lubricating materials are uniformly attached to or deposited on the wire surface in an appropriate amount per apparent unit area of the wire surface or per unit weight of the wire, the feedabilities of the wire immediately after commencement of welding are improved. Specification at page 9, lines 14-18. However, if a lubricating material is merely physically applied to, i.e., if a lubricating material is attached to wire surfaces only by the action of the wettability of a lubricating oil, the lubricating material readily separates from the wire surfaces after welding over a long time. Specification page 9, line 19 to page 10, line 1. This entails easy clogging within the conduit cable and means that the feedabilities are impeded conversely with the lubricating material, which has been added or applied to the wire surfaces so as to improve the wire feedabilities. Specification at page 10, lines 1-4.

The present inventors have conducted extensive studies on welding wire feedability using chain compounds having 13 or more carbon atoms (higher fatty acids and their salts), but any significant effect on improving wire feedability could not be obtained. Specification at page 16, line 19 to page 17, line 4. This is considered for the reason that the carbon chain is longer than as necessary, so that chain compounds having 13 or more carbons are unlikely to orient on a wire surface. Specification at page 17, lines 4-7. On the other hand, with respect to chain compounds having 4 or less carbon atoms, it was found that as the number of carbon atoms decreases, the function of the carbon chain as an oleophilic group becomes weakened and it cannot be expected that these salts effectively serve as a kind of paste or binder for fixing a lubricating oil. Specification at page 17, line 19 to page 18, line 3. In this

way, chain compounds useful in the present invention are defined as ones having from 5 to 12 carbon atoms. Specification page 18, lines 3-5.

The specification at Tables 9-1 to 9-6 compares inventive examples with 5 to 12 carbon atoms and comparative examples with stearic acid (18 carbon atoms) or with acetic acid (2 carbon atoms). The comparison demonstrates significant improvements in wire feedability (feed resistance, feed resistance stability and degree of clogging) achieved according to the present invention when "the at least one compound has a saturated or unsaturated, linear or branched, structure with from 5 to 12 carbon atoms".

Because the cited prior art fails to suggest the significant improvements in wire feedability achieved according to the present invention, any *prima facie* case of obviousness based on the cited prior art is rebutted. Thus, JP-974 in view of Katono fails to have rendered obvious the claimed invention. Therefore, the rejection under 35 U.S.C. §103(a) over JP-974 in view of Katono should be withdrawn. Applicants respectfully request reconsideration and withdrawal of the rejection.

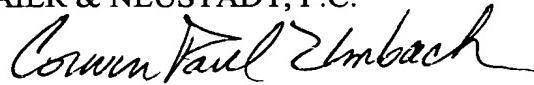
Claims 1, 3-10 and 12-13 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1-8 of U.S. Patent No. 6,337,144 ("144") in view of JP 51-144353 ("JP-353"). Independent Claim 1 is amended to recite "the at least one compound has a saturated or unsaturated, linear or branched, structure with from 5 to 12 carbon atoms". In contrast, Claims 1-9 of '144 feature a naphthenic acid or metal naphthenate each having a five-member or a six-member ring structure. Applicants submit that Claims 1-9 of '144 in view of JP-353 do not suggest independent Claim 1, as amended. Therefore, the obviousness-type double patenting rejection should be withdrawn. Applicants respectfully request reconsideration and withdrawal of the rejection.

In view of the foregoing amendments and remarks, Applicants respectfully submit that the application is in condition for allowance. Applicants respectfully request favorable consideration and prompt allowance of the application.

Should the Examiner believe that anything further is necessary in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned attorney at the telephone numbers listed below.

Respectfully submitted,

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Attachment:

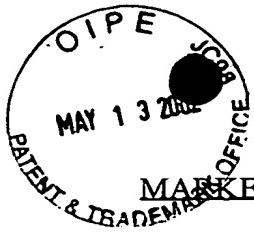
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IN RE APPLICATION OF:

HIROYUKI SHIMIZU ET AL

: EXAMINER: JACKSON, M.

SERIAL NO. : 09/960,487

:

FILED: SEPTEMBER 24, 2001

: GROUP ART UNIT: 1773

FOR: WIRE FOR WELDING

AMENDMENT

**RECEIVED**  
*MAY 15 2002*  
**TC 1700**

ASSISTANT COMMISSIONER FOR PATENTS  
WASHINGTON, D.C. 20231

SIR:

In response to the Office Action dated February 13, 2002, please amend the application identified above as follows (marked-up copies of amendments attached).

IN THE CLAIMS

Please cancel Claims 5-8 without prejudice to or disclaimer of the subject matter therein.

Please amend Claims 1, 3-4, 10 and 12 as follows:

1. (Twice Amended) A welding wire comprising

a wire having a wire surface; and

a deposit on the wire surface, wherein

the deposit comprises

at least one lubricating particle, and

at least one [hydrocarbon] compound selected from the group consisting of carboxylic acids and metal carboxylates;

the at least one lubricating particle comprises a material selected from the group consisting of molybdenum disulfide, tungsten disulfide, graphite carbon and polytetrafluoroethylene;

the at least one [hydrocarbon] compound consists of atoms selected from the group consisting of hydrogen, carbon, oxygen, nitrogen, sulfur, phosphorus and metal atoms; and

the at least one [hydrocarbon] compound has [either a cyclic structure, or] a saturated or unsaturated, linear or branched, structure with from 5 to 12 carbon atoms.

3. (Twice Amended) The welding wire according to Claim 1, wherein the at least one [hydrocarbon] compound comprises a carboxylic acid selected from the group consisting of pentanoic acid, caproic acid, caprylic acid, octylic acid, secanoic acid, capric acid, decanoic acid, lauric acid, linderic acid and synthetic fatty acids.

4. (Twice Amended) The welding wire according to Claim 1, wherein the [hydrocarbon] compound comprises a metal carboxylate that is a metal salt of a carboxylic acid selected from the group consisting of pentanoic acid, caproic acid, caprylic acid, octylic acid, secanoic acid, capric acid, decanoic acid, lauric acid, linderic acid and synthetic fatty acids; and

the metal salt comprises a metal selected from the group consisting of Li, Na, Mg, Al, K, Ca, Ti, Cr, Mn, Fe, Co, Ni, Cu, Zn, Zr, Sn, Cs, Pb and Ce.

10. (Twice Amended) The welding wire according to Claim 9, wherein the at least one [hydrocarbon] compound and the at least one lubricating oil are deposited on the wire surface in a total amount of 0.1 to 5 g per 10 kg of the wire.

12. (Twice Amended) The welding wire according to Claim 1, wherein the at least one [hydrocarbon] compound and the at least one lubricating particle are deposited on the wire surface in a total amount of 0.1 to 5 g per 10 kg of the wire.